

CLEMSON

IMPACTS

Cleaning up
dirty water

CLEMSON UNIVERSITY PUBLIC SERVICE ACTIVITIES - FALL 2009



Impact of chicken cages
Agribusiness for 21st century
Using soil to hold carbon
Switchgrass heads to Europe

Vice President's Message



As a result of state budget reductions, we had to make strategic decisions about how to continue our core mission with significantly less resources. As of July 1, the cuts amounted to \$13.9 million, or more than 26% of our state funds.

This is below the state funding level in 1989, without adjusting for inflation or increases in the state's population. To deal with cuts of this magnitude, we implemented a mandatory five-day furlough and a hiring freeze, eliminated vacant and temporary positions, offered a voluntary early retirement program, significantly reduced

operating expenses, and deferred much needed renovations to animal research farms.

Clemson Public Service now has 165 fewer employee positions than last year. One noticeable change is that Extension agents are now covering multiple counties.

We will continue to follow our strategic plan, adopted in 2005, to reduce dependence on state funding. This involves both seeking alternate revenue sources and carefully reviewing our programs in light of the state's needs and the availability of resources.

You'll notice that this issue of *Clemson Impacts* is smaller than previous issues, and focuses on work in agriculture and environmental conservation. Reports on these and other areas are online at www.clemson.edu/public/impacts/. We also have reduced the number of editions from four to three to reduce printing costs.

Our goal is to identify the most effective and cost-efficient manner to develop and deliver the science-based information needed to stimulate economic recovery in South Carolina – particularly in the agriculture and natural resources sector.

Sincerely,

John W. Kelly
Vice President for Public Service and Agriculture

CLEMSON[®]

PUBLIC SERVICE ACTIVITIES

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Knowledge for living.
Knowledge for life.

Investigating the impact of cages on laying hens

By Peter Kent

Animal protection advocates want to eliminate caged-layer egg production but there isn't much data on the impact that cage systems have on chickens.

To meet egg industry needs for science-based information, Clemson animal behaviorist Peter Skewes is researching the impact cages and other confinements have on the development and well-being of hens.

"Cages were designed to keep hens clean, safe from predators, protected from adverse weather conditions and easily medicated to prevent disease," said Skewes. "Initially, little thought was given to how cages affected behavioral needs."

More is at stake than just the comfort of chickens, though the well-being of 284 million U.S. laying hens is no small matter. Nearly 95 percent of the 90 billion table eggs produced in the United States come from high-density cage systems. The value of South Carolina egg production is about \$90 million annually.

For more information: Peter Skewes, 864-656-4026, pskewes@clemson.edu.



Photo by Peter Kent

Clemson launches S.C. Market Maker

By Peter Hull

The Palmetto State's freshest seafood and agriculture is just a mouse click away through a new interactive Web site: S.C. Market Maker.

From a farmer looking for a place to sell fresh-grown baby greens to a grocery store manager who wants to stock his coolers with locally caught shrimp, Market Maker's interactive mapping system can locate businesses and products across the state.

The innovative tool provides an important link for producers and consumers, said R. David Lamie, Extension specialist at the Clemson Institute for Economic and Community Development, who is leading the project in South Carolina.

"This online tool will help the state's agriculture and seafood industries reach new markets and help consumers find just what they are looking for," Lamie said.

Bringing Market Maker to South Carolina was a cooperative effort between Public Service Activities, S.C. Department of Agriculture, S.C. Sea Grant Consortium and the U.S. Department of Agriculture Natural Resources Conservation Service.

For more information: David Lamie, 803-788-5700 ext. 36, dlamie@clemson.edu or www.scmakemaker.com.



Photo by Peter Hull

Reducing risks from produce grown with compost

By Peter Kent

Organic and commercial produce growers sometimes use animal manure or compost as fertilizer and soil enrichment.

This reduces the use of chemicals but can increase the risk of food-borne illnesses from salmonella and E. coli bacteria that occur naturally in manure.

That risk is greater in crops such as lettuce, spinach, and cantaloupe. Bacteria can last more than a year under the right conditions; but Clemson research found that many are easily destroyed by heat.

"Heat generated by microbial activities during composting can lower bacterial counts in compost, but the temperature and duration must be sufficient," said food safety scientist Xiuping Jiang.

Her research team is seeking to identify how disease-causing organisms in compost react to heat, and to develop methods to detect and control these organisms in manure-based compost. This research is funded by a grant from the University of California-Davis.

For more information: Xiuping Jiang, 864-656-6932, xiuping@clemson.edu.



Photo by Peter Kent

Conference showcases agribusiness for the 21st century

By Peter Hull

South Carolina growers and farmers glimpsed the future during the fifth annual RAIN conference, held in January at Clemson University's Pee Dee Research and Education Center in Florence.

RAIN is an acronym for Research, Agriculture, Industry and Nature. The theme of this year's daylong conference was "Agribusiness for the 21st century through value-added collaborations - a South Carolina initiative."

More than 85 attendees heard presentations from a host of industry experts, including the Palmetto Institute, S.C. Department of Agriculture and the Carolina Agri-Solutions Growers Association.

Topics covered included how to establish a successful vineyard, the state of agriculture in South Carolina and the growth of agritourism in the state.

The keynote speaker was Kenneth Meinhardt, owner of Meinhardt Vineyard and Winery in Statesboro, Ga., one of the largest wineries in the Peach State.

The conference was sponsored by Coastal Carolina University, Francis Marion University and Clemson University.

For more information: Jody Martin, 843-661-4800 ext. 115 or jamrtn@clemson.edu.



Photo by Tom Lollis

Peach experts help fruit growers fight fungus

By Peter Kent

The brown rot fungus is a hardy survivalist, adapting to control efforts by Southeastern peach growers. The situation poses a problem for South Carolina and Georgia, which behind California rank second and third in U.S. peach production. The two states account for 25 percent of the nation's fresh peaches, selling about \$60 million worth of peaches a year.

"We've developed a kit that will enable growers to determine the resistance profile in their respective areas," said Clemson plant pathologist Guido Schnabel, state specialist for fruit diseases. "So right off the bat a grower starts out with the correct sprays and uses

the correct chemicals knowing what resistance profile they have."

Besides saving the growers money and helping the environment by using fewer chemicals, the work by Schnabel and colleagues has more far-reaching benefits. "The research and techniques can be used for other stone-fruit crops because the disease also affects nectarines and cherries and plum," said Schnabel.

Details on the kit, including an instructional video, are online: www.clemson.edu/extension/horticulture/fruit_vegetable/peach/diseases/br_profile.html

For more information: Guido Schnabel, 864-656-6705, schnabe@clemson.edu.



Photo by Donna Bowen

Clemson's switchgrass heading to Europe

By Peter Hull

Researchers at Clemson University's Pee Dee Research and Education Center in Florence have teamed with a Charleston company to supply switchgrass to European power plants as a substitute for coal to generate electricity.

Carolina-Pacific LLC will ship more than 350,000 tons of switchgrass per year beginning in 2012. The initiative is worth more than \$20 million a year to South Carolina farmers during the next decade.

Clemson agronomist James Frederick, who studies the science and technology of utilizing plants for food and fuel, said the initiative will benefit South Carolina farmers and rural communities along the Interstate 95 corridor.

"Wide-scale switchgrass production will help fill the economic losses created by the decline in markets for the region's traditional crops, such as cotton and tobacco," Frederick said.

Carolina-Pacific will pay farmers for their crops and Clemson researchers will assist in how to plant crops and make the most from their fields.

For more information: Jim Frederick, 843-662-3526 ext. 228, jfrdrck@clemson.edu or www.clemson.edu/public/rec/peedee.



Photo by Peter Hull

Cleaning up oil exploration's dirty water

By Peter Kent

Drilling for oil and natural gas can contaminate water that comes out of the ground during production ... amounting to billions of gallons of lost water resources.

Clemson environmental scientists Jim Castle and John Rodgers are investigating economical and environmentally sensible ways to treat the contaminated water for reuse. The focus of their research is constructed wetland systems. A constructed wetland is an artificial marsh or swamp to filter pollutants from



Photo courtesy of Brenda Johnson

water. This can provide habitat for wildlife, and help reclaim land after mining. The research is funded by the U.S. Department of Energy and Chevron Corporation.

Their work may help the nation achieve both energy self-sufficiency and environmental sustainability. Department of Energy experts say that water "comprises 98 percent of all waste generated by U.S. oil and natural gas operations. Handling and disposal of this water is the single greatest environmental impediment to natural gas and oil exploration and production."

For more information: John Rodgers, 864-656-0492, jrodger@clemson.edu.

Stormwater consortium educates public

By Peter Hull

The 2009 Harbor Fest celebration in Charleston featured more than just tall ships.

The Ashley Cooper Stormwater Education Consortium, Carolina Clear's stormwater pollution education and awareness initiative in the Lowcountry, sponsored Water Walk at the festival's Education Village.

Visitors to the special education area learned why it is everyone's responsibility to keep surface waters free of pollution. The interactive exhibit explained that everyday actions affect the region's water quality, the importance of water conservation and steps everyone can take to help improve water quality.

"These actions – such as picking up after dogs – may seem trivial, but they add up," said David Joyner, Clemson Extension Natural Resources Agent and coordinator of the Ashley Cooper consortium. "A central theme of the exhibit was that we each have a role in maintaining healthy watersheds."

For more information: David Joyner, 843-722-5940 ext. 125, djoyner@clemson.edu or www.clemson.edu/carolinaclear.



Photo by David Joyner

Plant disease controlled before causing threat

By Peter Kent

A plant disease that presents a serious threat to the citrus industry has been located in South Carolina for the first time. Federal and state plant-health officials confirmed the presence of citrus greening, which produces fruit that is bitter and unmarketable.

The disease was first discovered in a leaf sample from a residential property in Charleston County. Clemson Department of Plant Industry officials established restrictions and a quarantine to prohibit the movement of citrus plants and other hosts from the area, and removed the infected trees.

Citrus inspections will continue throughout the state. Outreach and education to nurseries, plant dealers and citrus hobbyists has been conducted as well to make them aware of the disease and its potential impact on the U.S. citrus industry.

For more information: Christel Harden, 864-646-2135, charden@clemson.edu.



Photo courtesy of Clemson Plant Industry

Reducing the risk of wildfires in Georgetown County

By Peter Hull

Wildfires that devastated parts of Horry County showed how natural habitats can fuel the flames.

Researchers at the Baruch Institute of Coastal Ecology and Forest Science have helped prevent a similar disaster in parts of Georgetown County.

The institute conducted a fuel mitigation project to remove natural material that could help a wildfire burn in a forested area adjacent to the DeBordieu Colony neighborhood.

The “fuel” – under-story and mid-story of the forest, such as pine straw and branches that had fallen to the ground – was removed in three areas of the forest that border the residential development.

All told, 25 acres were cleared. Although the available fuel was not completely eliminated, the ability for combustion was drastically reduced, said Jeffery Vernon, research associate and GIS specialist at the Baruch Institute.

“Whatever fuels that were on the ground – anything that could ignite and create a wildfire – were removed,” Vernon said.

For more information: Jeffery Vernon, 843-546-1013 ext. 247, jvernon@clermson.edu or www.clemson.edu/baruch/.



Photo courtesy of Bluewater Services LLC



Photo by Elena Mikhailova

Using soil to reduce carbon load on climate

By Peter Kent

Soils play a vital role in dealing with the environmental impacts of rising atmospheric carbon levels — primarily carbon dioxide — from natural and human activities.

As carbon is released through fossil-fuel burning and changing land use, scientists are seeking a more accurate understanding of carbon storage and cycling. Soil is second only to the oceans as a carbon sink: pools into which more carbon flows in than out.

Clemson natural resources scientists are studying soil types and ranking them on their ability to hold carbon and prevent it from returning to the atmosphere for eons.

“Formation of new carbonate minerals in soils represents a pathway by which atmospheric (carbon dioxide) can be sequestered,” said Elena Mikhailova, research team leader.

Further studies will measure and profile the soil carbon characteristics and identify regional distribution to develop predictive models for future soil inorganic carbon research.

For more information: Elena Mikhailova, 864-656-3535, eleam@clermson.edu.



Photo by Peter Hull

Turf School goes on the road

By Peter Hull

Turf management professionals learned the latest techniques for maintaining high quality turfgrass in the 2009 Turf School.

The one-day course went on the road, with classes in Myrtle Beach, Columbia and Greenville for turf professionals responsible for sports fields, grounds, lawns, recreational parks, and sod production.

The class demonstrated how to identify and manage water quality, insects, pathology, fertilization and weeds. Other sessions included the management of turfgrass insects, irrigation water quality and warm-season turfgrass fertilizers. Pesticide recertification credits also were awarded.

The turfgrass program is based at the Pee Dee Research and Education Center in Florence. Through scientific trials, Clemson scientists work to minimize economic and environmental costs of turfgrass management while meeting federal and state guidelines, and regulations.

For more information: Dara Park, 843-662-3526 ext. 206, darap@clemson.edu or www.clemson.edu/extension/horticulture/turf/.

Shaping the future of South Carolina's coast

By Peter Hull

How will South Carolina's coastline look 20 years from now?

A research team from Clemson's Strom Thurmond Institute, led by James London, has prepared a report for the state's Office of Ocean and Coastal Resource Management as it reassessed South Carolina's 20-year-old Beachfront Management Act.

The researchers examined affects of coastal development and environment influences – information state officials will use to make decisions about future shoreline management.

Through a series of public meetings in Myrtle Beach, Charleston and Hilton Head, the group looked at how other states approach coastline management, how the South Carolina coast has changed during the last 20 years and options for dealing with the natural dynamics of sand movement.

"An important part of the process was to gather public input on management options to address shoreline changes along the beachfront and in near-shore areas," London said.

For more information: James London, 864-656-3927, london1@clemson.edu or www.strom.clemson.edu.

AN ASSESSMENT OF SHORELINE MANAGEMENT OPTIONS ALONG THE SOUTH CAROLINA COAST



Carolina Clear launches rain garden manual

By Peter Hull

Stormwater education and awareness program Carolina Clear has published a rain garden manual to help homeowners manage yard and rooftop runoff.

The 16-page manual is available for free download from the Carolina Clear Web site, or a bound copy can be purchased for \$4.

The popularity of rain gardens has grown enormously as more people become aware of the effects of their homes and yards on nearby water bodies, said Katie Giacalone, Carolina Clear statewide coordinator.

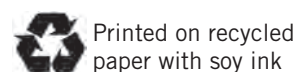
As development spreads, so does the area of impervious surfaces, such as roads, parking lots and sidewalks. Water runs over these surfaces and picks up pollutants, which are carried to lakes, rivers and wetlands.

Rain gardens let nature play a role. They remove pollutants that otherwise would affect water quality and allow stormwater to infiltrate the groundwater table.

"Building rain gardens is something entire neighborhoods can do to reduce how the environment is affected," Giacalone said.

For more information: Katie Giacalone, 843-554-7226 ext. 115, kgiacal@clemson.edu or www.clemson.edu/carolinaclear

Address service requested



Livestock officials monitor “swine” flu situation

By Peter Kent

As cases of the H1N1 (swine) flu were reported in the U.S. and in South Carolina, Clemson Livestock Poultry Health veterinarians and staff monitored the situation closely and planned appropriate steps to protect animal and human health.

Scientists determined that the “swine” flu outbreak did not affect animals and that swine production operations currently do not pose a flu threat to the public. Clemson veterinarians also advised the public that pork, cooked properly, is safe to eat.

According to the National Agriculture Statistics Service, cash receipts from farm marketing for livestock products in South Carolina totaled \$1.1 billion. Of that total, hogs contributed about \$51 million.

The state regulatory agency for animal health and meat inspection, Livestock Poultry Health programs protect the quality of life for humans, as well as companion and food animals. Responsibilities include surveillance for diseases that affect humans and animals, diagnostics to identify and treat animal diseases, and regulation of meat and poultry production in the state.

For more information: Michael Martin, 803-788-2260 ext. 230, mmarti5@clemson.edu.



Photo by Boyd Parr